SEQUENCE LISTING

<110> Institut Pasteur

<120> ANTIGÈNES DE PLASMODIUM FALCIPARUM ET LEURS APPLICATIONS VACCINALES ET DIAGNOSTIQUES

<130> 000466-0035

<150> CA 2,345,206

<151> 2001-05-16

<150> CA 2,346,968

<151> 2001-05-23

<160> 18

<170> PatentIn version 3.1

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agagaagatc ctattgcttc tgaaactgaa gttgtaagtg aacctgagga ttcaagtagg 180

ataatgacta cagaagttcc aagtactact gtaaaacccc ctgatgaaaa acgatctgaa 240

gaagtaggag aaaaagaagc taaagaaatt aaagtagaac ctgttgtacc aagagccatt 300

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Ser Asp Asn Lys Asn Val Ile Lys Ser Asp Asn Lys Asn Val Glu Phe
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20 25 30

Asp Asn Gln Ser Asn Val Leu Asn Arg Glu Asp Pro Ile Ala Ser Glu
35 40 45

Thr Glu Val Val Ser Glu Pro Glu Asp Ser Ser Arg Ile Met Thr Thr
50 55 60

Glu Val Pro Ser Thr Thr Val Lys Pro Pro Asp Glu Lys Arg Ser Glu

65 70 75 80

Glu Val Gly Glu Lys Glu Ala Lys Glu Ile Lys Val Glu Pro Val Val
85 90 95

Pro Arg Ala Ile Gly Glu Pro Met Glu Asn Ser Val Ser Val Gln Ser
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Pro Pro Lys Glu Phe
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Asp Asn Lys Asn Asp
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20 25 30

tat ttt ttg gat gac aac aaa gaa aaa gat gtt agt aag aaa aga aaa 144
Tyr Phe Leu Asp Asp Asn Lys Glu Lys Asp Val Ser Lys Lys Arg Lys
35 40 45

gct caa ttg aag gat gaa tat gat aat ata tca agg agc aaa gaa aat 192
Ala Gln Leu Lys Asp Glu Tyr Asp Asn Ile Ser Arg Ser Lys Glu Asn
50 55 60

att aat aat tcc aaa aaa ata aaa aat gaa tta agt ata aaa gat aat 240
Ile Asn Asn Ser Lys Lys Ile Lys Asn Glu Leu Ser Ile Lys Asp Asn
65 70 75 80

atg cac gat tac ata tat gat gat cgt atc tac aat aat gat aaa gag 288
Met His Asp Tyr Ile Tyr Asp Asp Arg Ile Tyr Asn Asn Asp Lys Glu
85 90 95

aaa aat gtt ata aaa agt gat aat aaa aat gtt ata aaa agt gat aat 336
Lys Asn Val Ile Lys Ser Asp Asn Lys Asn Val Ile Lys Ser Asp Asn
100 105 110

aaa aat gat tat aaa aag tgt aat aaa aat gtt ata aaa agt gat aat 384
Lys Asn Asp Tyr Lys Lys Cys Asn Lys Asn Val Ile Lys Ser Asp Asn
115 120 125

aaa aat gtt ata aaa agt gat aat aaa aat gtt ata aaa agt gat aat 432
Lys Asn Val Ile Lys Ser Asp Asn Lys Asn Val Ile Lys Ser Asp Asn
130 135 140

aaa aat gtt ata aaa agt gat tat aaa agt gat gat aga aat gct tgt 480
Lys Asn Val Ile Lys Ser Asp Tyr Lys Ser Asp Asp Arg Asn Ala Cys

145 150 155 160

gat att tat aaa agt aat aaa aaa aat gtt cct gat aat tgc cat ata 528
Asp Ile Tyr Lys Ser Asn Lys Lys Asn Val Pro Asp Asn Cys His Ile
165 170 175

tat gat gat aat agt tca gtt gaa aat tta gat gga aaa aat aaa tta 576
Tyr Asp Asp Asn Ser Ser Val Glu Asn Leu Asp Gly Lys Asn Lys Leu
180 185 190

aat aat ata agg aac ata cat aat gat aac tca tct tca tgc gat ata 624
Asn Asn Ile Arg Asn Ile His Asn Asp Asn Ser Ser Ser Cys Asp Ile
195 200 205

tcc gat ata aaa agt gaa gat gaa tat ata gaa cca tat gaa aaa aag 672
Ser Asp Ile Lys Ser Glu Asp Glu Tyr Ile Glu Pro Tyr Glu Lys Lys
210 215 220

aat gaa gaa aat ata aat gaa tat aag aat aag aaa aat ata gcc aat 720
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225 230 235 240

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245 250 255

tat aat tca tta tta tat aat tct tgt aat ggt gaa ata agt aag atc 816
Tyr Asn Ser Leu Leu Tyr Asn Ser Cys Asn Gly Glu Ile Ser Lys Ile
260 265 270

aac aaa ata agt agt cat aat aat att gat aat aat atg gat aat tat 864
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275 280 285

aat acg ttt gca aat gtg aat aat ttt ata ata tat tcc tca gat gat 912
Asn Thr Phe Ala Asn Val Asn Asn Phe Ile Ile Tyr Ser Ser Asp Asp
290 295 300

gaa gat aat ata tca aat tat tat aat ggt aaa gac gta tta aat gat 960
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305 310 315 320

gag att atg ttc cct ata aaa ttt aat ttt gaa aaa tta aaa aaa aat 1008
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325 330 335

att tat gta ata gag cat ata gac aaa ata tat tat gat aca ttt tta 1056
Ile Tyr Val Ile Glu His Ile Asp Lys Ile Tyr Tyr Asp Thr Phe Leu
340 345 350

aat aaa aat cca agt gaa aaa agt gtt ttt atg aat gat gaa tct act 1104
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355 360 365

ggt tat ttg aaa aat gat gtg aat gac aaa tgt gtt gtt gat aat ata 1152
Gly Tyr Leu Lys Asn Asp Val Asn Asp Lys Cys Val Val Asp Asn Ile
370 375 380

aat gtt att aat cct tct agt gtg aat acg ttg agt aat att tca aat 1200
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385 390 395 400

att agg aat gaa aaa ata gaa aat aat aat aag aat gaa aaa tta ata 1248
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405 410 415

aaa tca tat cct aca caa tca aaa aat gtt atg agt aca ttt tcc ttt 1296
Lys Ser Tyr Pro Thr Gln Ser Lys Asn Val Met Ser Thr Phe Ser Phe
420 425 430

tgg aat att gaa aag gag aca ttt ata aca aaa cct ttg tat gca caa 1344
Trp Asn Ile Glu Lys Glu Thr Phe Ile Thr Lys Pro Leu Tyr Ala Gln
435 440 445

aat ttg aga aaa aaa caa ttt agt tta tta gat gaa tct gaa gag atg 1392
Asn Leu Arg Lys Lys Gln Phe Ser Leu Leu Asp Glu Ser Glu Glu Met
450 455 460

ata aga aat tat tca tct aat caa tat tct ata aaa ttt gta cca aga 1440
Ile Arg Asn Tyr Ser Ser Asn Gln Tyr Ser Ile Lys Phe Val Pro Arg
465 470 475 480

cat tta tta tat gta atg agt caa gtt gct tct cga tcc ttt ttt gat 1488
His Leu Leu Tyr Val Met Ser Gln Val Ala Ser Arg Ser Phe Phe Asp
485 490 495

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<212> PRT

<213> Plasmodium falciparum

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Tyr Phe Leu Asp Asp Asn Lys Glu Lys Asp Val Ser Lys Lys Arg Lys
35 40 45

Ala Gln Leu Lys Asp Glu Tyr Asp Asn Ile Ser Arg Ser Lys Glu Asn
50 55 60

Ile Asn Asn Ser Lys Lys Ile Lys Asn Glu Leu Ser Ile Lys Asp Asn
65 70 75 80

Met His Asp Tyr Ile Tyr Asp Asp Arg Ile Tyr Asn Asn Asp Lys Glu
85 90 95

Lys Asn Val Ile Lys Ser Asp Asn Lys Asn Val Ile Lys Ser Asp Asn
100 105 110

Lys Asn Asp Tyr Lys Lys Cys Asn Lys Asn Val Ile Lys Ser Asp Asn
115 120 125

Lys Asn Val Ile Lys Ser Asp Asn Lys Asn Val Ile Lys Ser Asp Asn
130 135 140

Lys Asn Val Ile Lys Ser Asp Tyr Lys Ser Asp Asp Arg Asn Ala Cys
145 150 155 160

Asp Ile Tyr Lys Ser Asn Lys Lys Asn Val Pro Asp Asn Cys His Ile
165 170 175

Tyr Asp Asp Asn Ser Ser Val Glu Asn Leu Asp Gly Lys Asn Lys Leu
180 185 190

Asn Asn Ile Arg Asn Ile His Asn Asp Asn Ser Ser Ser Cys Asp Ile
195 200 205

Ser Asp Ile Lys Ser Glu Asp Glu Tyr Ile Glu Pro Tyr Glu Lys Lys
210 215 220

Asn Glu Glu Asn Ile Asn Glu Tyr Lys Asn Lys Lys Asn Ile Ala Asn
225 230 235 240

Glu Asn Ile Lys Glu Gly Lys Ser Ser Ile Tyr Asn Asp Glu His Asn
245 250 255

Tyr Asn Ser Leu Leu Tyr Asn Ser Cys Asn Gly Glu Ile Ser Lys Ile
260 265 270

Asn Lys Ile Ser Ser His Asn Asn Ile Asp Asn Asn Met Asp Asn Tyr
275 280 285

Asn Thr Phe Ala Asn Val Asn Asn Phe Ile Ile Tyr Ser Ser Asp Asp
290 295 300

Glu Asp Asn Ile Ser Asn Tyr Tyr Asn Gly Lys Asp Val Leu Asn Asp
305 310 315 320

Glu Ile Met Phe Pro Ile Lys Phe Asn Phe Glu Lys Leu Lys Lys Asn

325 330 335

Ile Tyr Val Ile Glu His Ile Asp Lys Ile Tyr Tyr Asp Thr Phe Leu
340 345 350

Asn Lys Asn Pro Ser Glu Lys Ser Val Phe Met Asn Asp Glu Ser Thr
355 360 365

Gly Tyr Leu Lys Asn Asp Val Asn Asp Lys Cys Val Val Asp Asn Ile
370 375 380

Asn Val Ile Asn Pro Ser Ser Val Asn Thr Leu Ser Asn Ile Ser Asn
385 390 395 400

Ile Arg Asn Glu Lys Ile Glu Asn Asn Asn Lys Asn Glu Lys Leu Ile
405 410 415

Lys Ser Tyr Pro Thr Gln Ser Lys Asn Val Met Ser Thr Phe Ser Phe
420 425 430

Trp Asn Ile Glu Lys Glu Thr Phe Ile Thr Lys Pro Leu Tyr Ala Gln
435 440 445

Asn Leu Arg Lys Lys Gln Phe Ser Leu Leu Asp Glu Ser Glu Glu Met
450 455 460

Ile Arg Asn Tyr Ser Ser Asn Gln Tyr Ser Ile Lys Phe Val Pro Arg
465 470 475 480

His Leu Leu Tyr Val Met Ser Gln Val Ala Ser Arg Ser Phe Phe Asp
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Pro Leu Tyr Arg Lys Gln Leu Phe Phe Arg Tyr
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tat gtt gta tta tgt acc tat gta tta ggt ata agt gaa gag tat ttg 96
Tyr Val Val Leu Cys Thr Tyr Val Leu Gly Ile Ser Glu Glu Tyr Leu
20 25 30

aag gaa agg ccc caa ggt tta aat gtt gag act aat aat aat aat aat 144
Lys Glu Arg Pro Gln Gly Leu Asn Val Glu Thr Asn Asn Asn Asn Asn
35 40 45

aat aat aat aat aat aat agt aat agt aac gat gcg atg tct ttt gta 192
Asn Asn Asn Asn Asn Asn Ser Asn Ser Asn Asp Ala Met Ser Phe Val
50 55 60

aat gaa gta ata agg ttt ata gaa aac gag aag gat gat aaa gaa gat 240
Asn Glu Val Ile Arg Phe Ile Glu Asn Glu Lys Asp Asp Lys Glu Asp
65 70 75 80

aaa aaa gtg aag ata ata tct aga cct gtt gag aat aca tta cat aga 288
Lys Lys Val Lys Ile Ile Ser Arg Pro Val Glu Asn Thr Leu His Arg
85 90 95

tat cca gtt agt tct ttt ctg aat atc aaa aag tat ggt agg aaa ggg 336
Tyr Pro Val Ser Ser Phe Leu Asn Ile Lys Lys Tyr Gly Arg Lys Gly
100 105 110

gaa tat ttg aat aga aat agt ttt gtt caa aga tca tat ata agg ggt 384
Glu Tyr Leu Asn Arg Asn Ser Phe Val Gln Arg Ser Tyr Ile Arg Gly
115 120 125

tgt aaa gga aaa aga agc aca cat aca tgg ata tgt gaa aat aaa ggg 432
Cys Lys Gly Lys Arg Ser Thr His Thr Trp Ile Cys Glu Asn Lys Gly
130 135 140

aat aat aat ata tgt att cct gat aga cgt gta caa tta tgt ata aca 480
Asn Asn Asn Ile Cys Ile Pro Asp Arg Arg Val Gln Leu Cys Ile Thr
145 150 155 160

gct ctt caa gat tta aaa aat tca gga tct gaa acg act gat aga aaa 528
Ala Leu Gln Asp Leu Lys Asn Ser Gly Ser Glu Thr Thr Asp Arg Lys
165 170 175

tta tta aga gat aaa gta ttt gat tca gct atg tat gaa act gat ttg 576
Leu Leu Arg Asp Lys Val Phe Asp Ser Ala Met Tyr Glu Thr Asp Leu
180 185 190

tta tgg aat aaa tat ggt ttt cgt gga ttt gat gat ttt tgt gac gat 624
Leu Trp Asn Lys Tyr Gly Phe Arg Gly Phe Asp Asp Phe Cys Asp Asp
195 200 205

gta aaa aat agt tat tta gat tat aaa gat gtt ata ttt gga acc gat 672
Val Lys Asn Ser Tyr Leu Asp Tyr Lys Asp Val Ile Phe Gly Thr Asp
210 215 220

tta gat aaa aat aat ata tca aag tta gta gag gaa tca tta aaa cgt 720
Leu Asp Lys Asn Asn Ile Ser Lys Leu Val Glu Glu Ser Leu Lys Arg
225 230 235 240

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Phe Phe Lys Lys Asp Ser Ser Val Leu Asn Pro Thr Ala Trp Trp Arg
245 250 255

agg tat gga aca aga cta tgg aaa act atg ata cag cca tat gct cat 816
Arg Tyr Gly Thr Arg Leu Trp Lys Thr Met Ile Gln Pro Tyr Ala His
260 265 270

tta gga tgt aga aaa cct gat gag aat gaa cct cag ata aat aga tgg 864
Leu Gly Cys Arg Lys Pro Asp Glu Asn Glu Pro Gln Ile Asn Arg Trp
275 280 285

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Ile Leu Glu Trp Gly Lys Tyr Asn Cys Arg Leu Met Lys Glu Lys Glu
290 295 300

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Lys Leu Leu Thr Gly Glu Cys Ser Val Asn Arg Lys Lys Ser Asp Cys
305 310 315 320

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325 330 335

aga caa aga tat gag gtc tct ata tta gga aaa aaa tat att aaa gta 1056
Arg Gln Arg Tyr Glu Val Ser Ile Leu Gly Lys Lys Tyr Ile Lys Val

340 345 350

gta cga tat act ata ttt agg aga aaa ata gtt caa cct gat aat gct 1104
Val Arg Tyr Thr Ile Phe Arg Arg Lys Ile Val Gln Pro Asp Asn Ala
355 360 365

ttg gat ttt tta aaa tta aat tgt tct gag tgt aag gat att gat ttt 1152
Leu Asp Phe Leu Lys Leu Asn Cys Ser Glu Cys Lys Asp Ile Asp Phe
370 375 380

aaa ccc ttt ttt gaa ttt gaa tat ggt aaa tat gaa gaa aaa tgt atg 1200
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385 390 395 400

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Cys Gln Ser Tyr Ile Asp Leu Lys Ile Gln Phe Lys Asn Asn Asp Ile
405 410 415

tgt tca ttt aat gct caa aca gat act gtt tct agc gat aaa aga ttt 1296
Cys Ser Phe Asn Ala Gln Thr Asp Thr Val Ser Ser Asp Lys Arg Phe
420 425 430

tgt ctt gaa aag aaa gaa ttt aaa cca tgg aaa tgt gat aaa aat tct 1344
Cys Leu Glu Lys Lys Glu Phe Lys Pro Trp Lys Cys Asp Lys Asn Ser
435 440 445

ttt gaa aca gtt cat cat aaa ggt gta tgt gtg tca ccg aga aga caa 1392
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450 455 460

ggt ttt tgt tta gga aat ttg aac tat cta ctg aat gat gat att tat 1440
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465 470 475 480

aat gta cat aat tca caa cta ctt atc gaa att ata atg gct tct aaa 1488
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485 490 495

caa gaa gga aag tta tta tgg aaa aaa cat gga aca ata ctt gat aac 1536
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500 505 510

cag aat gca tgc aaa tat ata aat gat agt tat gtt gat tat aaa gat 1584
Gln Asn Ala Cys Lys Tyr Ile Asn Asp Ser Tyr Val Asp Tyr Lys Asp
515 520 525

ata gtt att gga aat gat tta tgg aat gat aac aac tct ata aaa gtt 1632
Ile Val Ile Gly Asn Asp Leu Trp Asn Asp Asn Asn Ser Ile Lys Val
530 535 540

caa aat aat tta aat tta att ttt gaa aga aat ttt ggt tat aaa gtt 1680
Gln Asn Asn Leu Asn Leu Ile Phe Glu Arg Asn Phe Gly Tyr Lys Val
545 550 555 560

gga aga aat aaa ctc ttt aaa aca att aaa gaa tta aaa aat gta tgg 1728
Gly Arg Asn Lys Leu Phe Lys Thr Ile Lys Glu Leu Lys Asn Val Trp
565 570 575

tgg ata tta aat aga aat aaa gta tgg gaa tca atg aga tgt gga att 1776
Trp Ile Leu Asn Arg Asn Lys Val Trp Glu Ser Met Arg Cys Gly Ile
580 585 590

gac gaa gta gat caa cgt aga aaa act tgt gaa aga ata gat gaa cta 1824
Asp Glu Val Asp Gln Arg Arg Lys Thr Cys Glu Arg Ile Asp Glu Leu
595 600 605

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610 615 620

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625 630 635 640

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645 650 655

gtg tgt act aat atg aat tat tgg aca tat act aga aaa tta gct tat 2016
Val Cys Thr Asn Met Asn Tyr Trp Thr Tyr Thr Arg Lys Leu Ala Tyr
660 665 670

gaa ata caa tcc gta aaa tat gat aaa gat aga aaa tta ttt agt ctt 2064
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675 680 685

gct aaa gac aaa aat gta act aca ttt tta aag gaa aat gca aaa aat 2112
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690 695 700

tgt tct aat ata gat ttt aca aaa ata ttc gat cag ctt gac aaa ctc 2160
Cys Ser Asn Ile Asp Phe Thr Lys Ile Phe Asp Gln Leu Asp Lys Leu

705 710 715 720

ttt aag gaa aga tgt tca tgt atg gat aca caa gtt tta gaa gta aaa 2208
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725 730 735

aac aaa gaa atg tta tct ata gac tca aat agt gaa gat gcg aca gat 2256
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740 745 750

ata agt gag aaa aat gga gag gaa gaa tta tat gta aat cac aat tct 2304
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755 760 765

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Val Ser Val Ala Ser Gly Asn Lys Glu Ile Glu Lys Ser Lys Asp Glu
770 775 780

aag caa cct gaa aaa gaa gca aaa caa act aat gga act tta acc gta 2400
Lys Gln Pro Glu Lys Glu Ala Lys Gln Thr Asn Gly Thr Leu Thr Val
785 790 795 800

cga act gac aaa gat tca gat aga aac aaa gga aaa gat aca gct act 2448
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805 810 815

gat aca aaa aat tca cct gaa aat tta aaa gta cag gaa cat gga aca 2496
Asp Thr Lys Asn Ser Pro Glu Asn Leu Lys Val Gln Glu His Gly Thr
820 825 830

aat gga gaa aca ata aaa gaa gaa cca cca aaa tta cct gaa tca tct 2544
Asn Gly Glu Thr Ile Lys Glu Glu Pro Pro Lys Leu Pro Glu Ser Ser
835 840 845

gaa aca tta caa tca caa gaa caa tta gaa gca gaa gca caa aaa caa 2592
Glu Thr Leu Gln Ser Gln Glu Gln Leu Glu Ala Glu Ala Gln Lys Gln
850 855 860

aaa caa gaa gaa gaa cca aaa aaa aaa caa gaa gaa gaa cca aaa aaa 2640
Lys Gln Glu Glu Glu Pro Lys Lys Lys Gln Glu Glu Glu Pro Lys Lys
865 870 875 880

aaa caa gaa gaa gaa caa aaa cga gaa caa gaa caa aaa caa gaa caa 2688
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885 890 895

gaa gaa gaa gaa caa aaa caa gaa gaa gaa caa caa ata caa gat caa 2736
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900 905 910

tca caa agt gga tta gat caa tcc tca aaa gta gga gta gcg agt gaa 2784
Ser Gln Ser Gly Leu Asp Gln Ser Ser Lys Val Gly Val Ala Ser Glu
915 920 925

caa aat gaa att tct tca gga caa gaa caa aac gta aaa agc tct tca 2832
Gln Asn Glu Ile Ser Ser Gly Gln Glu Gln Asn Val Lys Ser Ser Ser
930 935 940

cct gaa gta gtt cca caa gaa aca act agt gaa aat ggg tca tca caa 2880
Pro Glu Val Val Pro Gln Glu Thr Thr Ser Glu Asn Gly Ser Ser Gln
945 950 955 960

gac aca aaa ata tca agt act gaa cca aat gag aat tct gtt gta gat 2928
Asp Thr Lys Ile Ser Ser Thr Glu Pro Asn Glu Asn Ser Val Val Asp
965 970 975

aga gca aca gat agt atg aat tta gat cct gaa aag gtt cat aat gaa 2976
Arg Ala Thr Asp Ser Met Asn Leu Asp Pro Glu Lys Val His Asn Glu
980 985 990

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Asn Met Ser Asp Pro Asn Thr Asn Thr Glu Pro Asp Ala Ser Leu Lys
995 1000 1005

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Asp Asp Lys Lys Glu Val Asp Asp Ala Lys Lys Glu Leu Gln Ser
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act gta tca aga att gaa tct aat gaa cag gac gtt caa agt aca 3114
Thr Val Ser Arg Ile Glu Ser Asn Glu Gln Asp Val Gln Ser Thr
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cca ccc gaa gat act cct act gtt gaa gga aaa gta gga gat aaa 3159
Pro Pro Glu Asp Thr Pro Thr Val Glu Gly Lys Val Gly Asp Lys
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gca gaa atg tta act tct ccg cat gcg aca gat aat tct gag tcg 3204
Ala Glu Met Leu Thr Ser Pro His Ala Thr Asp Asn Ser Glu Ser
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Glu Ser Gly Leu Asn Pro Thr Asp Asp Ile Lys Thr Thr Asp Gly

1070 1075 1080

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Val Val Lys Glu Gln Glu Ile Leu Gly Gly Gly Glu Ser Ala Thr
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gaa aca tca aaa agt aat tta gaa aaa cct aag gat gtt gaa cct 3339
Glu Thr Ser Lys Ser Asn Leu Glu Lys Pro Lys Asp Val Glu Pro
1100 1105 1110

tct cat gaa ata tct gaa cct gtt ctt tct ggt aca act ggt aaa 3384
Ser His Glu Ile Ser Glu Pro Val Leu Ser Gly Thr Thr Gly Lys
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Glu Thr Asp Pro Arg Ser Asn Asp Gln Glu Asp Ala Thr Asp Asp
1145 1150 1155

gtt gta gaa aat agt aga gat gat aat aat agt ctc tct aat agc 3519
Val Val Glu Asn Ser Arg Asp Asp Asn Asn Ser Leu Ser Asn Ser
1160 1165 1170

gta gat aat caa agt aat gtt tta aat aga gaa gat cct att gct 3564
Val Asp Asn Gln Ser Asn Val Leu Asn Arg Glu Asp Pro Ile Ala
1175 1180 1185

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Ser Glu Thr Glu Val Val Ser Glu Pro Glu Asp Ser Ser Arg Ile
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Met Thr Thr Glu Val Pro Ser Thr Thr Val Lys Pro Pro Asp Glu
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Lys Arg Ser Glu Glu Val Gly Glu Lys Glu Ala Lys Glu Ile Lys
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gta gaa cct gtt gta cca aga gcc att gga gaa cca atg gaa aat 3744
Val Glu Pro Val Val Pro Arg Ala Ile Gly Glu Pro Met Glu Asn
1235 1240 1245

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Ser Val Ser Val Gln Ser Pro Pro Asn Val Glu Asp Val Glu Lys
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Glu Thr Leu Ile Ser Glu Asn Asn Gly Leu His Asn Asp Thr His
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Arg Gly Asn Ile Ser Glu Lys Asp Leu Ile Asp Ile His Leu Leu
1280 1285 1290

aga aat gaa gcg ggt agt aca ata tta gat gat tct aga aga aat 3924
Arg Asn Glu Ala Gly Ser Thr Ile Leu Asp Asp Ser Arg Arg Asn
1295 1300 1305

gga gaa atg aca gaa ggt agc gaa agt gat gtt gga gaa tta caa 3969
Gly Glu Met Thr Glu Gly Ser Glu Ser Asp Val Gly Glu Leu Gln
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gaa cat aat ttt agc aca caa caa aaa gat gaa aaa gat ttt gac 4014
Glu His Asn Phe Ser Thr Gln Gln Lys Asp Glu Lys Asp Phe Asp
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caa att gcg agc gat aga gaa aaa gaa gaa att caa aaa tta ctt 4059
Gln Ile Ala Ser Asp Arg Glu Lys Glu Glu Ile Gln Lys Leu Leu
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aat ata gga cat gaa gag gat gaa gat gta tta aaa atg gat aga 4104
Asn Ile Gly His Glu Glu Asp Glu Asp Val Leu Lys Met Asp Arg
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aca gag gat agt atg agt gat gga gtt aat agt cat ttg tat tat 4149
Thr Glu Asp Ser Met Ser Asp Gly Val Asn Ser His Leu Tyr Tyr
1370 1375 1380

aat aat cta tca agt gaa gaa aaa atg gaa caa tat aat aat aga 4194
Asn Asn Leu Ser Ser Glu Glu Lys Met Glu Gln Tyr Asn Asn Arg
1385 1390 1395

gat gct tct aaa gat aga gaa gaa ata ttg aat agg tca aac aca 4239
Asp Ala Ser Lys Asp Arg Glu Glu Ile Leu Asn Arg Ser Asn Thr
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aat aca tgt tct aat gaa cat tca tta aaa tat tgt caa tat atg 4284
Asn Thr Cys Ser Asn Glu His Ser Leu Lys Tyr Cys Gln Tyr Met

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Glu Arg Asn Lys Asp Leu Leu Glu Thr Cys Ser Glu Asp Lys Arg
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tta cat tta tgt tgt gaa ata tca gat tat tgt tta aaa ttt ttc 4374
Leu His Leu Cys Cys Glu Ile Ser Asp Tyr Cys Leu Lys Phe Phe
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Asn Pro Lys Ser Ile Glu Tyr Phe Asp Cys Thr Gln Lys Glu Phe
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gat gac cct aca tat aat tgt ttt aga aaa caa aga ttt aca agt 4464
Asp Asp Pro Thr Tyr Asn Cys Phe Arg Lys Gln Arg Phe Thr Ser
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atgtcatgtt ataaaattaa aaacaatata cattaatatg ttaataaaaa aaataatata 4524

tttttttctc tttttctttt tttttaatag gt atg cat tat att gcc ggg ggt 4577
Met His Tyr Ile Ala Gly Gly
1490 1495

ggt ata ata gcc ctt tta ttg ttt att tta ggt tca gcc agc tat 4622
Gly Ile Ile Ala Leu Leu Leu Phe Ile Leu Gly Ser Ala Ser Tyr
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agg aag aat ttg taagaaaaaa aggatgaaga aatataaaca aaaatataaa 4674
Arg Lys Asn Leu

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attttattat tatagg gat gat gaa aaa gga ttc tac gat tct aat tta 4783
Asp Asp Glu Lys Gly Phe Tyr Asp Ser Asn Leu
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Asn Asp Ser Ala Phe Glu Tyr Asn Asn Asn Lys Tyr Asn Lys Leu
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cct tat atg tgtaaggaaa aaactaaaaa acaaaaaaaa aaaaaaatat 4877
Pro Tyr Met

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aatttttatt atttatttat ttatttttt ttttc gta gtt gat caa caa ata 4990
Val Val Asp Gln Gln Ile
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35 40 45

Asn Asn Asn Asn Asn Asn Ser Asn Ser Asn Asp Ala Met Ser Phe Val
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Asn Glu Val Ile Arg Phe Ile Glu Asn Glu Lys Asp Asp Lys Glu Asp
65 70 75 80

Lys Lys Val Lys Ile Ile Ser Arg Pro Val Glu Asn Thr Leu His Arg
85 90 95

Tyr Pro Val Ser Ser Phe Leu Asn Ile Lys Lys Tyr Gly Arg Lys Gly
100 105 110

Glu Tyr Leu Asn Arg Asn Ser Phe Val Gln Arg Ser Tyr Ile Arg Gly
115 120 125

Cys Lys Gly Lys Arg Ser Thr His Thr Trp Ile Cys Glu Asn Lys Gly
130 135 140

Asn Asn Asn Ile Cys Ile Pro Asp Arg Arg Val Gln Leu Cys Ile Thr
145 150 155 160

Ala Leu Gln Asp Leu Lys Asn Ser Gly Ser Glu Thr Thr Asp Arg Lys
165 170 175

Leu Leu Arg Asp Lys Val Phe Asp Ser Ala Met Tyr Glu Thr Asp Leu
180 185 190

Leu Trp Asn Lys Tyr Gly Phe Arg Gly Phe Asp Asp Phe Cys Asp Asp
195 200 205

Val Lys Asn Ser Tyr Leu Asp Tyr Lys Asp Val Ile Phe Gly Thr Asp
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Leu Asp Lys Asn Asn Ile Ser Lys Leu Val Glu Glu Ser Leu Lys Arg
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Phe Phe Lys Lys Asp Ser Ser Val Leu Asn Pro Thr Ala Trp Trp Arg
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Arg Tyr Gly Thr Arg Leu Trp Lys Thr Met Ile Gln Pro Tyr Ala His

260 265 270

Leu Gly Cys Arg Lys Pro Asp Glu Asn Glu Pro Gln Ile Asn Arg Trp
275 280 285

Ile Leu Glu Trp Gly Lys Tyr Asn Cys Arg Leu Met Lys Glu Lys Glu
290 295 300

Lys Leu Leu Thr Gly Glu Cys Ser Val Asn Arg Lys Lys Ser Asp Cys
305 310 315 320

Ser Thr Gly Cys Asn Asn Glu Cys Tyr Thr Tyr Arg Ser Leu Ile Asn
325 330 335

Arg Gln Arg Tyr Glu Val Ser Ile Leu Gly Lys Lys Tyr Ile Lys Val
340 345 350

Val Arg Tyr Thr Ile Phe Arg Arg Lys Ile Val Gln Pro Asp Asn Ala
355 360 365

Leu Asp Phe Leu Lys Leu Asn Cys Ser Glu Cys Lys Asp Ile Asp Phe
370 375 380

Lys Pro Phe Phe Glu Phe Glu Tyr Gly Lys Tyr Glu Glu Lys Cys Met
385 390 395 400

Cys Gln Ser Tyr Ile Asp Leu Lys Ile Gln Phe Lys Asn Asn Asp Ile
405 410 415

Cys Ser Phe Asn Ala Gln Thr Asp Thr Val Ser Ser Asp Lys Arg Phe
420 425 430

Cys Leu Glu Lys Lys Glu Phe Lys Pro Trp Lys Cys Asp Lys Asn Ser
435 440 445

Phe Glu Thr Val His His Lys Gly Val Cys Val Ser Pro Arg Arg Gln
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Gly Phe Cys Leu Gly Asn Leu Asn Tyr Leu Leu Asn Asp Asp Ile Tyr
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Asn Val His Asn Ser Gln Leu Leu Ile Glu Ile Ile Met Ala Ser Lys
485 490 495

Gln Glu Gly Lys Leu Leu Trp Lys Lys His Gly Thr Ile Leu Asp Asn
500 505 510

Gln Asn Ala Cys Lys Tyr Ile Asn Asp Ser Tyr Val Asp Tyr Lys Asp
515 520 525

Ile Val Ile Gly Asn Asp Leu Trp Asn Asp Asn Asn Ser Ile Lys Val
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Gln Asn Asn Leu Asn Leu Ile Phe Glu Arg Asn Phe Gly Tyr Lys Val
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Gly Arg Asn Lys Leu Phe Lys Thr Ile Lys Glu Leu Lys Asn Val Trp
565 570 575

Trp Ile Leu Asn Arg Asn Lys Val Trp Glu Ser Met Arg Cys Gly Ile
580 585 590

Asp Glu Val Asp Gln Arg Arg Lys Thr Cys Glu Arg Ile Asp Glu Leu
595 600 605

Glu Asn Met Pro Gln Phe Phe Arg Trp Phe Ser Gln Trp Ala His Phe
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Phe Cys Lys Glu Lys Glu Tyr Trp Glu Leu Lys Leu Asn Asp Lys Cys

625 630 635 640

Thr Gly Asn Asn Gly Lys Ser Leu Cys Gln Asp Lys Thr Cys Gln Asn
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Val Cys Thr Asn Met Asn Tyr Trp Thr Tyr Thr Arg Lys Leu Ala Tyr
660 665 670

Glu Ile Gln Ser Val Lys Tyr Asp Lys Asp Arg Lys Leu Phe Ser Leu
675 680 685

Ala Lys Asp Lys Asn Val Thr Thr Phe Leu Lys Glu Asn Ala Lys Asn
690 695 700

Cys Ser Asn Ile Asp Phe Thr Lys Ile Phe Asp Gln Leu Asp Lys Leu
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Phe Lys Glu Arg Cys Ser Cys Met Asp Thr Gln Val Leu Glu Val Lys
725 730 735

Asn Lys Glu Met Leu Ser Ile Asp Ser Asn Ser Glu Asp Ala Thr Asp
740 745 750

Ile Ser Glu Lys Asn Gly Glu Glu Glu Leu Tyr Val Asn His Asn Ser
755 760 765

Val Ser Val Ala Ser Gly Asn Lys Glu Ile Glu Lys Ser Lys Asp Glu
770 775 780

Lys Gln Pro Glu Lys Glu Ala Lys Gln Thr Asn Gly Thr Leu Thr Val
785 790 795 800

Arg Thr Asp Lys Asp Ser Asp Arg Asn Lys Gly Lys Asp Thr Ala Thr
805 810 815

Asp Thr Lys Asn Ser Pro Glu Asn Leu Lys Val Gln Glu His Gly Thr
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Asn Gly Glu Thr Ile Lys Glu Glu Pro Pro Lys Leu Pro Glu Ser Ser
835 840 845

Glu Thr Leu Gln Ser Gln Glu Gln Leu Glu Ala Glu Ala Gln Lys Gln
850 855 860

Lys Gln Glu Glu Glu Pro Lys Lys Lys Gln Glu Glu Glu Pro Lys Lys
865 870 875 880

Lys Gln Glu Glu Glu Gln Lys Arg Glu Gln Glu Gln Lys Gln Glu Gln
885 890 895

Glu Glu Glu Glu Gln Lys Gln Glu Glu Glu Gln Gln Ile Gln Asp Gln
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Ser Gln Ser Gly Leu Asp Gln Ser Ser Lys Val Gly Val Ala Ser Glu
915 920 925

Gln Asn Glu Ile Ser Ser Gly Gln Glu Gln Asn Val Lys Ser Ser Ser
930 935 940

Pro Glu Val Val Pro Gln Glu Thr Thr Ser Glu Asn Gly Ser Ser Gln
945 950 955 960

Asp Thr Lys Ile Ser Ser Thr Glu Pro Asn Glu Asn Ser Val Val Asp
965 970 975

Arg Ala Thr Asp Ser Met Asn Leu Asp Pro Glu Lys Val His Asn Glu
980 985 990

Asn Met Ser Asp Pro Asn Thr Asn Thr Glu Pro Asp Ala Ser Leu Lys

995 1000 1005

Asp Asp Lys Lys Glu Val Asp Asp Ala Lys Lys Glu Leu Gln Ser
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1325 1330 1335

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Asn Pro Lys Ser Ile Glu Tyr Phe Asp Cys Thr Gln Lys Glu Phe
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Asp Asp Pro Thr Tyr Asn Cys Phe Arg Lys Gln Arg Phe Thr Ser
1475 1480 1485

Met His Tyr Ile Ala Gly Gly Gly Ile Ile Ala Leu Leu Leu Phe
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